

Memorandum

To: Light Brown Apple Moth Environmental Task Force

Date: November 26, 2007

Place: Sacramento

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From: **Department of Food and Agriculture** Robert V. Dowell, Ph.D.
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Subject: **Response to LBAM Task Force Issues and Concerns**

There were several issues raised at our first meeting that I would like to address more thoroughly in writing. The first was the impact of the light brown apple moth (LBAM) pheromone on native moths, addressed below.

Native Moths Attracted to LBAM Pheromone

Below is a list of the non-target moths commonly found in our LBAM traps according to the moth specialist in the CDFA Plant Pest Diagnostic Center:

Pyralidae:

Achyra occidentalis (no common name)

Tortricidae:

Henricus umbrabasanus (no common name)

Archips argyrospilus (fruit-tree leafroller)

Clepsis peritana (garden tortrix)

Clepsis fucana (no common name)

Argyrotaenia franciscana (=citrana) (orange tortrix)

In addition, one of the components of the LBAM pheromone is used commercially for control of the omnivorous leafroller, *Platynota stultana*, which is an exotic invader and not a native insect to California.

Distribution in California

All of the native moths listed above are of widespread distribution. A query to the California Moth Database found records from the following counties for each of the native moths listed above.

Achyra occidentalis: Alameda, Colusa, Contra Costa, Fresno, Humboldt, Inyo, Kern, Kings, Lake, Los Angeles, Marin, Merced, Monterey, Napa, Nevada, Riverside, Sacramento, San Benito, San Diego, San Joaquin, San Luis Obispo, Santa Barbara, Santa Clara, Siskiyou, Solano, Tulare, Ventura, Yolo

Henricus umbrabasanus: Alameda, Calaveras, Contra Costa, El Dorado, Kern, Los Angeles, Marin, Monterey, Napa, Nevada, Orange, Sacramento, San Bernardino, San Diego, San Francisco, San Joaquin, Santa Barbara, Santa Clara, Siskiyou, Solano, Ventura, Yolo

Archips argyrospilus (listed as *Archips argyrospila*) (fruit-tree leafroller): Alameda, Butte, Contra Costa, El Dorado, Humboldt, Kern, Lake, Lassen, Los Angeles, Marin, Mariposa, Modoc, Mono, Monterey, Napa, Nevada, Orange, Placer, Plumas, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Siskiyou, Solano, Stanislaus, Trinity, Tulare, Ventura, Yolo, Yuba

Clepsis peritana (listed under *Ptycholoma peritana*) (garden tortrix): Alameda, Butte, Contra Costa, El Dorado, Fresno, Humboldt, Inyo, Kern, Los Angeles, Marin, Mendocino, Mono, Monterey, Orange, Placer, Riverside, Sacramento, , San Bernardino, San Diego, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Siskiyou, Solano, Sutter, Tehama, Tulare, Tuolumne, Ventura, Yolo

Clepsis fucana (no common name): Alameda, Del Norte, Humboldt, Marin, Mendocino, Monterey, San Bernardino, San Francisco, San Mateo, Santa Cruz, Sonoma, Trinity

Argyrotaenia franciscana (= *citrana*) (orange tortrix): Alameda, Contra Costa, Humboldt, Kern, Los Angeles, Marin, Mendocino, Monterey, Napa, Orange, Riverside, Sacramento, San Diego, San Francisco, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Ventura

(Caveat: Most taxonomists will describe range data as generally accurate but not necessarily complete. Occurrences may not have been entered into the records from which the databases were generated, the name of the insect may have changed and not all previous names checked, no one may have bothered to record the occurrence, and no one may have looked in that county. One needs to view a lack of records from any county with some doubt especially for common insects. However, it's the best data we have.)

Discussion and Interpretation

All of these moths have sex pheromones that are structurally similar to those used by LBAM. Insects with structurally dissimilar sex pheromones will not respond to the LBAM pheromone. One way to envision the sex pheromone is as a key and the receptor as a lock. To respond to the pheromone, the key must be able to fit into the lock and open it to cause the male moth to respond. Closely related moths use structurally similar pheromones or pheromone blends. As the degree of relatedness decreases, the sex pheromones become increasingly dissimilar structurally and the key will not fit the lock.

It is likely that the mating disruption treatments applied for LBAM will interfere with the mating of the six moths listed above to some degree. As we discussed earlier, one can view the LBAM treatments as creating a small area within which the densities of these native moths will be reduced. These small areas are surrounded by large areas in which the native moths will not be affected and from which they will continuously invade the treated area. This effect was seen during our 1980-82 Mediterranean fruit fly spray program in which large areas were treated with 10-20 aerial sprays of Malathion and bait. The numbers of beneficial insects were reduced within the treatment zones but they rebounded to normal after the sprays were stopped. The speed with which the non-target populations rebounded was directly related to the number of generations each insect has per year. The greater the number of generations the faster they re-invaded the treated area (L. E. Ehler and P. C. Endicott. 1984. Effect of Malathion-Bait Sprays on Biological Control of Insect Pests of Olive, Citrus and Walnut. Hilgardia Volume 52 Number 5 April 1984. University of California, Division of Agriculture and Natural Resources). We expect the same thing to occur in this situation.

In addition, the CDFA doesn't expect the LBAM pheromone treatments to affect the population of native moths any more than the current agricultural use of related omnivorous leafroller pheromone.

The difference between the minor effect of the LBAM pheromone on the native moth populations and the large effect on the LBAM population is in regards to the continuous invasion of the treated area from surrounding areas. The LBAM is not established in California, and there is no widespread reservoir from which to re-invade treated areas. This makes it possible to eradicate the LBAM population without materially affecting the populations of the native moths.